# DEVELOPMENT OF A DATA MANAGEMENT SYSTEM FOR ASSISTANCE IN CONDUCTING AREA OF REVIEWS (AORS) ON CLASS II INJECTION WELLS IN OKLAHOMA

Cooperative Agreement Grant No. DE-FG22-95MT95003

Oklahoma Corporation Commission

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Program Manager: Michael S. Battles

Principal Investigator(s): Michael W. Schmidt

Contracting Officer's Representative (COR): David Alleman

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**Abstract:** The purpose of this project is provide the resources and capabilities necessary to permit the State of Oklahoma to conduct Area of Review (AOR) variance analysis on a statewide level. The project allows for the analysis and identification of areas which may qualify for AOR variances, the correlation of information from various databases and automated systems to conduct AORs in area which do not qualify for variances, the evaluation of the risk of pollution, during permitting and monitoring, using risk based data analysis, and the ability to conduct spatial analysis of injection well data in conjunction with other geographically referenced information.

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## I. Executive Summary

The Oklahoma Corporation Commission is committed to assisting the oil and gas exploration and production industry in our State. This project saves the State and the E&P industry much time, effort and resources in our environmental protection efforts. We are actively combining the various data base resources available at the state level and the private sector. This enables the state to review existing and new permit applications for compliance with existing standards.

The project is running behind schedule currently due to the problems that we have experienced with the State's procurement department. Those problems we believe have finally been addressed by that department and the necessary equipment has been ordered. Due to these problems, DOE has granted a one year extension to the grant.

Also, BDM Oklahoma, a DOE contractor, is very helpful in our efforts. They are providing the resources needed to acquire the Geographical Information System (GIS), the completed well plugging data, and digitizing the state's ground water protection maps; all are necessary to fully implement this project.

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## II. Introduction

This project has one primary objective. This objective is to provide the resources and capabilities to permit the State of Oklahoma to conduct Area of Review (AOR) variance analysis on a statewide level. This objective includes four primary tasks: 1) the analysis and identification of areas which may qualify for AOR variances; 2) the correlation of information from various databases and automation systems to conduct AORs in areas that do not qualify for variances; 3) the evaluation of the risk of pollution, during permitting and monitoring, using risk based data analysis; and 4) the ability to conduct spatial analysis of injection well data in conjunction with other geographically referenced information.

The Corporation Commission is completely rewriting its oil and gas data management system to meet this objective and perform the tasks stated. This is a long, complicated and often frustrating process. All the equipment and software have been purchased and installed. The production server has been installed and is functioning. The servers for the district offices have been received and we will commence installation during the second quarter of 1997. The delays experienced in obtaining the equipment is a result of the state's procurement process.

Many data are being made available through the private sector and through a DOE contractor, BDM Oklahoma. These data are required to fully implement the proposed operating system.

## III. Results and Discussion

During this reporting quarter, the Oil and Gas Conservation Division employed only one professional to assist in the reconciliation of the UIC data base with that of the Well Data Maintenance System (WDMS), the division's main data base. (The second professional previously employed accepted a full-time position with another state agency. We have been unable to replace this individual to date.) The two systems were developed and maintained independently since UIC primacy was granted in 1982 and the well information maintained on the UIC data management system is incomplete. Progress toward achieving the goals of this project hinges on compatible data. This is the most integral portion of this process and is underway. We are using a special software tool to create new screens for the UIC staff, which are similar to their existing screens and functions. This integration will allow the commission to complete this program by having full integration before April 1998. This will allow the staff to perform an area of review using composite and available comprehensive digital data.

The programming and technical staff have been attending Oracle database software training as courses become available within the Oklahoma City area. The Commission conducted an onsite Oracle training session referred to as the Headstart Program. This training session resulted in the creation of one of the pieces of the AOR project concerning the pollution complaint information. There are further training courses scheduled onsite between September and December. This training also includes training for the users.

The Commission has four systems analysts/programmers and equipment specialists working toward the completion of this project, bringing the total employed using federal funds to five for this reporting period. In addition to the four systems analysts and the one professional currently employed using federal money, the commission has assigned the equivalent of four full-time state-funded employees to work toward the completion of this project. Two of the federally funded programmer/analysts are working on moving the Well Data Maintenance System to a client server environment. This also includes combining information from the existing UIC database in order to have access to all well information from a central point. The other two federally funded programmers/analysts are equipment specialists working on equipment installation, assisting Oil and Gas users with help hot line calls, and training the Oil and Gas staff on the new software.

The total hours expended in support of this project equals 21,681 hours. The DOE project staff expended 8,065 hours and the Commission state staff expended 13,616 hours.

We completed converting all of the remaining Well Data Maintenance System (WDMS) modules from the states host IBM mainframe to run on our own network. This conversion occurred in March 1997 with the installation of the new file server. The converted system includes several requested enhancements that have been backlogged. These enhancements have assisted the oil and gas staff in the day to day operations of the system.

The staff has completed interviewing and analyzing several departments within the Oil and Gas Division. It is planned to begin developing the Company and Surety portion of the new database this quarter. We should also be implementing the new Oil and Gas Detailed Order and Case Information System and the new Environmental Complaints System. While these are being implemented and referred to as separate systems they are actually one very large database. We will be adding the other systems upon completion of these three. The next system to add will be Well Inventory which consists of the permitting, completion, and plugging information.

We are in the process of upgrading the communication mechanism between the central and district offices. We will be upgrading the lines to T1 lines from 56 kb lines. We are also installing switches and new router cards that will allow connecting the districts through a faster media. Once completed the response for the district office staff will be as if they were a user within the central office. To ensure that all equipment planned for order would work properly, we purchased only 1 set. The Kingfisher District Office was connected according to the new communication plans and is running fine. We have ordered and received similar equipment for the other three District Offices and should have all remaining connected this next quarter.

The WDMS and combined UIC data system has been implemented since March 1997. The last of the annual report procedures were converted over which finished the initial project. Work is still ongoing to identify network and system bottlenecks in order to increase the throughput of utilizing the new temporary system.

In order to begin designing and developing the Well Inventory system we must have all of the wells identified within the state of Oklahoma. We are meeting with PI/Dwight's in late August to obtain a file consisting of all of the well completion information matched with API numbers and Production Unit numbers. We will be loading this data into a temporary system to provide for more efficient searches by the staff and public.

Once the data is loaded we will begin to integrate GIS maps developed by the Geological Information Systems group of the University of Oklahoma. Enhancements will be made in terms of creating additional layers of information that we maintain. This is an essential piece of the project. BDM is partially funding the entry of historic plugging data and the University of Oklahoma, GeoInformation Systems Department is working on a project. We have received the digitized well plugging information from BDM for three counties and the partial data for a forth county. The Commission has only entered plugging data since 1985. These data are being integrated within the WDMS system. This project also allows the University of Oklahoma to complete its Natural Resources Inventory System (NRIS) GIS called NRIS Maps. NRIS Maps will be imported directly into the Commission's operating system and modified to use digitized ground water information and other essential data to determine AOR viability.

The Commission continues to look at the feasibility of utilizing the RBDMS system from CH2MHill to populate with the combined well information to provide

for performing area of reviews. We are currently studying the RBDMS system in terms of the data structure and the functionality relating to the requirements of the UIC and WDMS systems. The plan is to submit detailed requirements document outlining the exact changes in terms of data structure and functionality by the middle of September. CH2MHill will then resubmit a proposal for accomplishing the outlined requirements.

When completed the system will provide for the comprehensive electronic review of composite well information from which to perform an area of review.

We finalized the bid process on the GIS software. The selection was to purchase ArcInfo for the GIS enterprise server and ArcView for the desktops. The software was ordered and is due to be received this quarter. There is software for several central office staff members as well as each of the field staff's laptop computers.

We have ordered a version of the Oracle database software to run on each of the field staff's laptop computers. This software will provide for advanced replication of data between the field, district offices, and the central office.

## IV. Conclusion

The project is proceeding according to plan except for the problems that have plagued us in our equipment procurement efforts through the Department of Central Services (the State's procurement department). The department subsequently adhered to its own procedures and allowed us to purchase the necessary equipment.

Since the project is so dependent on these vital pieces of equipment, we did not proceed as quickly as necessary to complete the project by the March 13, 1997 deadline. The commission requested an extension of the project's completion date due to the delays experienced in the procurement process. These delays caused the essential programming to be delayed. The request for extension was granted until March 13, 1998. All other processes are running on schedule.